

3. *On some Karroo Fishes from Central Africa.*—By S. H. HAUGHTON,
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(With Plates XXIX–XXXI and 2 Text-figures.)

Ischnolepis bancrofti gen. et sp. nov.

(Pl. XXIX.)

Co-types.—Two almost complete fish on slab No. 9338 in collection South African Museum; specimen No. 9339 in same collection.

Locality.—Lunsempfwa Valley, N. Rhodesia (lower portion); collected by Dr. Davis, and presented by Dr. J. A. Bancroft. Discovered in “a brown ferruginous shale with a maximum thickness so far found exposed of from 3 to 4 feet. Above this brown shale is a thin bed of a tough calcareous shale showing a peculiar cone-like structure” (Davis). Associated with fossil plants and *Palaestheria*.

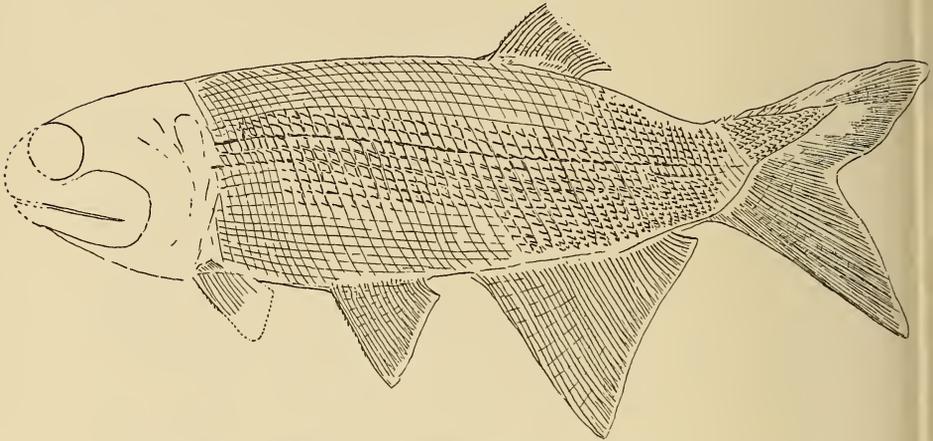
Horizon.—Probably Upper Beaufort or Lower Stormberg.

Generic Characters.—Body fusiform. Mandibular suspensorium oblique, gape moderately wide. Dentition consisting of sharp, well-spaced, delicate, anteriorly directed teeth in front part of mandible and maxilla, and sharp, robust, more closely packed teeth in the hinder two-thirds. Opercular apparatus relatively small; interoperculum well developed. One X-bone present in front of preoperculum. Fins with fulcra, forked distally, articulated except in pectoral; pectoral fin relatively short-based; pelvic fin long-based; dorsal fin remote, opposed to anal, rather high in front, with a moderately elongated base-line; anal fin much extended, high and acuminate in front, its base reaching almost to the lower caudal fork; caudal fin almost equilobate, body lobe not extending to distal end, and fairly blunt-ended. Scales small, rhomboidal, arranged in numerous rows passing slightly sigmoidally backwards from dorsal to ventral margins of body. Lateral line prominent, surrounded by fine tubes.

Specific Characters.—As for the genus. Fish small, up to 75 mm. in length. Head occupies about one-fifth of the entire length, greatest depth of body a little more than length of head, and in neighbourhood of pelvic fin.

Description.—The details of structure are obtained from the study of several specimens and a number of body and head fragments; no specimen is complete enough to show all the features. The arrangement of the bones of the head in the postorbital region is Palaeoniscid. A number of details can be obtained from a specimen that gives an inner view of the bones of this region.

The maxilla has a low suborbital portion and a higher and long postorbital part; the latter has a regularly curved upper border, and



TEXT-FIG. 1.—*Ischnolepis bancrofti*, Htn.
Restoration of body, drawn by Dr. K. H. Barnard.

has no pronounced upper posterior angle such as is seen in *Palaeoniscus*. The upper portion of the postorbital part of the bone is excavate on its inner surface, while the lower half is furnished with a series of small pits, which are elongated in an antero-posterior direction.

The mandible is rather weak, with a pointed anterior end. Its inner surface is apparently ornamented with irregular longitudinal grooves and ridges. It is not possible to determine whether it and the maxilla carry one or two rows of teeth. In the hinder two-thirds of the dentigerous borders the sharp-pointed but robust mandibular and maxillary teeth interdigitate closely; the anterior sharp-pointed slender teeth are more widely spaced.

The preoperculum is of the usual Palaeoniscid shape, with a narrow vertical posterior part forming the hinder boundary of the maxilla, and a deeper upper part lying above the maxilla. The front border of the preoperculum is excavate for the reception of a suborbital element. The long posterior margin meets the suboperculum, the

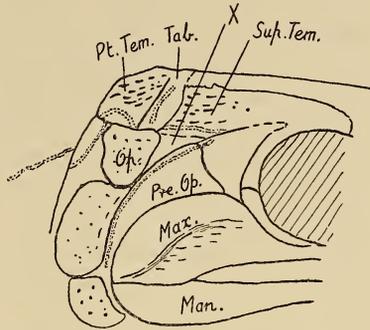
operculum and, superiorly, the supratemporal, and is convex. The bone is pierced, along its posterior border, by the preopercular sensory canal.

The operculum is a relatively small, somewhat triangular, plate, with a rounded ventral apex and a dorsal width nearly equal to its height. The upper anterior corner is of uncertain shape, but it is apparently separated from the preopercular by a small triangular ventral prolongation of the supratemporal, which may be a separate element corresponding to Traquair's bone X.

The suboperculum is larger than the operculum, and is higher than wide. Its anterior border is concave, its posterior and lower borders convex. The upper border is slightly excavate, so that there is a loose junction between the bone and the operculum. The upper anterior corner is acute-angled.

Ventrally to the suboperculum is a smaller reniform bone which probably belongs to the opercular series, and is here interpreted as an interoperculum. It lies behind the hinder end of the mandible, and has the same internal surface ornamentation of small circular pits as the suboperculum and operculum. The branchiostegal rays undoubtedly passed forward from the lower border of this bone; but no specimen shows them in contact with the bone, although their presence is confirmed by one fragmentary example which is seen in ventral view and which presents, on either side of a median triangular bony mass, a series of four or five overlapping branchiostegal plates lying mesial to the mandible.

In his recent paper on "Fossil Fishes from the Karroo System," Brough (P.Z.S., 1931, p. 234) figures the bone which is here described as an interoperculum, but describes it as probably the modified first branchiostegal ray, stating that it "does not correspond to the interoperculum." He also asserts the absence of branchiostegal rays in some Catopteryd genera, and thinks that they may be absent in all. The specimens from Northern Rhodesia described here as one species usually show no trace of such rays; and their presence is only confirmed by one fragmentary example which is, fortunately, seen in ventral view.



TEXT-FIG. 2.—*Ischnolepis bancrofti*, Htn.
Restoration of posterior part of skull, lateral view.

The ornamentation of the opercular bones on the external surface presumably consisted of small, rather scattered, low tubercles.

The limits of the membrane bones of the cranial roof are difficult to decipher exactly, but they can be drawn approximately from the positions of the sensory canals that penetrate them, which are preserved as raised tubes on the inner face of the skull.

Above the preopercular the lateral canal runs longitudinally through the supratemporal, which has apparently a ventral triangular portion wedged in between the opercular and preopercular. The supratemporal ("supratemporo-intertemporal" of Stensiö) has a somewhat digitated suture with the parietal and a straight suture with the tabular ("extrascapular" of Stensiö), which lies behind it. This latter carries the transverse tabular canal. The lateral canal cannot be traced in the tabular, which is a short broad bone; but its curved course through the presumed post-temporal ("suprascapular" of Stensiö) can be followed, and its continuation through the upper posterior corner of the supracleithrum to the lateral line of the body.

The shoulder-girdle is not fully displayed in any one specimen, but the cleithral and supracleithral are typically Palaeoniscid. The former is a bent pillar-like bone ornamented with longitudinal ridges; the supracleithral is an expanded plate with a strengthened anterior border. In front of the ventral prolongation of the cleithral, and partly enwrapping it, is a long, pointed triangular clavicle which, in one specimen, seems to be fused with its neighbour in the middle line.

The pectoral fin is small and low down on the body. The fin-rays, which are possibly about 15 in number, are forked distally, and seem to be unjointed throughout their length. There are well-developed small fulcra.

The pelvic fin is considerably larger than the pectoral, with about 20 rays, and is in front of the middle of the body. The rays are articulated near their bases, but apparently not distally. The rays are forked distally, and fulcra are present.

The anal fin has a long base, and in the anterior part is relatively high. The rays number about 50, but the baseosts are less than half this in number. The rays are forked and, at least in the anterior half of the fin, articulated.

The base of the dorsal fin is about half the length of that of the anal, and the number of fin-rays is about 20. In front of the fin there are a few enlarged pointed dorsal ridge-scales, and prominent fulcra are

developed. The front of the fin is opposite the front of the anal. The fin-rays are forked distally, and articulated throughout their length. The baseosts number only about half the fin-rays.

The caudal fin is deep and fairly deeply cleft, with the lobes about equal to one another and not excessively elongated. The body lobe is fairly long and somewhat bluntly pointed. All the rays of the fin are articulated and branched. At the base of the upper lobe are a number of elongated dorsal ridge-scales, and the anterior border of each lobe is furnished with fulcra.

A typical fish has an estimated length of 75 mm., a greatest depth of body (at pelvic fin) of 16.5 mm., and the length of base of anal fin 17 mm. The body has about 50 transverse rows of scales, which are small and very thin, and are apparently ornamented with two or three irregular longitudinal ridges. The lateral line of the body is enclosed in small tubular bones lying in a continuous longitudinal row, and continues backwards to the base of the caudal fin opposite to the point of bifurcation.

This fish, while bearing some resemblance to the Upper Beaufort genus *Helichthys*, does not seem to fall within the limits of any of the hitherto described Catopterygiform genera. The combination of characters presented by the head, body, fins, and scales—the small size, the smallness of the scales, the relative positions of the dorsal and long-based anal fins, and the probable presence of a well-defined interoperculum—give it a very distinctive appearance; one or more of these characters can be paralleled in one or another of the genera which have an oblique mandibular suspensorium, but they are not all found in combination in any of the known forms. The description of *Urolepis* given by de Alessandri almost fits the specimens under discussion; but his photographs of typical examples of that genus display distinct points of difference. It thus becomes necessary to found a new genus for these fishes, which can be known as *Ischnolepis bancrofti* gen. et sp. nov., the tribal name being given in honour of Dr. J. Bancroft, to whom the opportunity of studying these specimens is due. For the accompanying drawing of one of the co-types I am indebted to Dr. K. H. Barnard.

Pygopterus (?) sp.

A broken slab and partial counterslab display part of the body of a small-scaled fish in which the axial skeleton is well seen. Although the anal fin is not preserved and only a portion of the dorsal fin

remains, the latter was certainly small compared with the anal and did not arise in front of it.

Above the notochord there is a series of neural arches which diminish in height posteriorly, and whose height in the middle of the specimen is slightly less than the diameter of the notochord. The head of each arch is slightly dilated, and the arches are inclined backwards at about 45° to the axis of the notochord. Above each arch is an elongate slender neural spine whose proximal end only is dilated. The dorsal fin is supported by two rows of interspinous bodies, 12 or 13 in each row. Of these the axonosts are longer than the baseosts; both sets are more elongate than in "*Oxygnathus browni*". Both sets are slender, hour-glass shaped bones, and the length diminishes rapidly in the posterior half. The lepidotrichia of the dorsal fin are far more numerous than these endoskeletal radials.

Haemal arches occur from front to back of the specimen. They are longer than the neural arches, considerably swollen proximally, and only very slightly expanded distally. Each articulates with a long slender haemal spine. The anal fin is supported by a number of elongate endoskeletal radials arranged in a single row, each of which is dilated distally.

The relative sizes of the endoskeletal elements in this fragment are sufficient to differentiate the form from *Oxygnathus browni*, to which it approximates in size. The body scales were obviously small and thin; and the position of the dorsal fin with respect to the anal renders it possible that the fragment falls within the limits of *Pygopterus*.

This description is based on specimen No. 9340 in collection South African Museum, from the lower part of the Lunsempfwa Valley, N. Rhodesia. The slab and counter-slab were collected by Dr. Davis from the beds that yielded *Ischnolepis bancrofti*, and were presented by Dr. J. A. Bancroft.

Cf. *Atherstonia* sp.

(Pls. XXX, XXXI.)

Three specimens, obtained by Dr. Davis from the beds which yielded *Ischnolepis bancrofti* in the lower part of the Lunsempfwa Valley, North Rhodesia, give evidence of the presence of a large Palaeoniscid fish, although they are not complete enough to be generically identifiable. Each will be briefly described.

Specimen 9351 (in coll. S. Afr. Mus.).

Contains part of the head and pectoral fin. Operculum high and narrow, ornamented with irregular, closely set ridges and elongate

tubercles. Suboperculum very much smaller, subpentagonal in shape, as wide as high, ornamented with a central mass of rounded tubercles surrounded by irregularly curving ridges and elongate tubercles.

Branchiostegal rays numerous—23 being preserved; rays much wider than high.

Pre-operculum long and well developed, situated very obliquely. Bone slightly bent, rodlike posteriorly and expanded anteriorly.

Maxilla large, presumably Palaeoniscid in form.

Dentition (seen on mandible only) consists of stout conical teeth of two sizes, larger and smaller, rather widely spaced.

Pectoral fin incomplete; large, consisting of about 21 rays, of which most show dichotomous forking; fulcra numerous, but small; articulation doubtfully present in anterior rays.

Specimen 9350 (in coll. S. Afr. Mus.).

Slab and partial counter-slab, showing most of the body, lacking the tail and dorsal fin, together with the badly preserved posterior part of the head, and the pelvic and anal fins. Tentatively, it is considered to belong to the same species as the foregoing, although it is rather smaller. Body fusiform. Depth of body about half the length from posterior edge of clavicle to root of tail. Scales rather small with non-denticulated posterior borders, and ornamented with irregular, rather weak, forked, and anastomosing ridges. Continuous series of dorsal ridge-scales.

Pelvic fin rather closer to anal than to pectoral; rays nearly 30 in number, articulated, distally bifurcated; anterior rays longer than fin-base.

Anal fin long-based; rays numerous, articulated.

Position of dorsal fin not exactly determinable, but probably opposite to, or slightly in advance of, anal. It is certainly not behind the anal.

Specimen 9353 (in coll. S. Afr. Mus.).

The greater part of a tail, which probably belongs to this species. Tail strong and forked, upper and lower lobes about equal. Rays strong, jointed throughout their length, dichotomously forked. Dorsal lobe has ridge-scales of medium strength; ventral lobe has rather small fulcra. There are shown five strong haemal spines forming a support for the anterior part of the ventral lobe. The body squamation extends for a considerable distance up the dorsal lobe, and ends in a sharp point.

On account of the uncertainty concerning the position of the dorsal fin, it is not clear whether these specimens belong to that

group of the Palaeoniscidae that contains the genera *Acrolepis*, *Gyrolepis*, *Atherstonia*, *Myriolepis*, and *Oxygnathus*, or to that containing *Pygopterus* and *Urolepis*. It differs from *Acrolepis* in the length of base of the anal fin and in the size of the scales. It agrees with *Gyrolepis*, particularly in the relative narrowness and depth of the operculum and in the nature of the fins; it is larger than most of the described species of that genus, and its scales are smaller and not so deeply overlapping. The dorsal ridge-scales are not so pronounced as in *Atherstonia*, and the body-scales are smaller; the ornamentation on the scales is somewhat similar. *Myriolepis* differs in the possession of smaller scales and in having a short-based anal fin. In *Oxygnathus*, too, the scales are smaller and the body is more elongate.

The generic position of this form is thus rather doubtful. Of those cited, *Acrolepis*, *Atherstonia*, and "*Oxygnathus*" (Broom) are known from deposits in South Africa and Madagascar; and it would seem best temporarily to designate the forms under consideration simply as Cf. *Atherstonia* sp., recognising that there are certain points of difference that mark them off specifically at least from other members of the genus.